COMMONWEALTH OF VIRGINIA
STATE AIR POLLUTION CONTROL BOARD
REGULATIONS FOR THE CONTROL AND ABATEMENT OF AIR POLLUTION

9 VAC 5 CHAPTER 40.
EXISTING STATIONARY SOURCES.

PART II.
Emission Standards.

ARTICLE 43.
Emission Standards for Municipal Solid Waste Landfills (Rule 4-43).

9 VAC 5-40-5800. Applicability and designation of affected facility.

A. The affected facility to which the provisions of this article apply is each municipal solid waste (MSW) landfill which commenced construction, reconstruction, or modification before May 30, 1991.

B. The provisions of this article apply throughout the Commonwealth of Virginia.

C. For purposes of obtaining a federal operating permit, the owner of an MSW landfill subject to this article with a design capacity less than 2.5 million megagrams or 2.5 million cubic meters is not subject to the requirement to obtain a federal operating permit for the landfill, unless the landfill is otherwise subject to federal operating permit requirements. For purposes of submitting a timely application for a federal operating permit, the owner of an MSW landfill subject to this article with a design capacity greater than or equal to 2.5 million megagrams and 2.5 million cubic meters on the effective date of EPA approval of the board's program under § 111(d) of the federal Clean Air Act, and otherwise not subject to federal operating permit requirements, shall submit an operating permit application as provided in 9 VAC 5-80-80 C, even if the design capacity report is

submitted earlier.

D. When an MSW landfill subject to this article becomes closed, the owner is no longer subject to the requirement to maintain a federal operating permit for the landfill if the landfill is not otherwise subject to federal operating permit requirements and if either of the following conditions is met:

1. The landfill was never subject to the requirement for a control system under 9 VAC 5-40-5820 C 2; or

2. The owner meets the conditions for control system removal specified in 9 VAC 5-40-5820 C 2 e.

E. Activities required by or conducted pursuant to a CERCLA, RCRA, or board remedial action are not considered construction, reconstruction, or modification for the purposes of this article.

9 VAC 5-40-5810. Definitions.

A. For the purpose of applying this article in the context of the Regulations for the Control and Abatement of Air Pollution and related uses, the words or terms shall have the meaning given them in subsection C of this section.

B. As used in this article, all terms not defined here shall have the meaning given them in 9 VAC 5 Chapter 10 (9 VAC 5-10), unless otherwise required by context.

C. Terms Defined.

"Active collection system" means a gas collection system that uses gas mover equipment.

"Active landfill" means a landfill in which solid waste is being placed or a landfill that is planned to accept waste in the future.

"CERCLA" means the federal Comprehensive Environmental Response, Compensation, and Liability Act (42 USC 9601 et seq.).

"Closed landfill" means a landfill in which solid waste is no longer being placed, and in which no additional solid wastes will be placed without first filing a notification of modification, as prescribed under 40 CFR 60.7(a)(4), with the board. Once a notification of modification has been filed, and additional solid waste is placed in the landfill, the landfill is no longer closed.

"Closure" means that point in time when a landfill becomes a closed landfill.

"Commenced" means that an owner has undertaken a continuous program of construction or modification or that an owner has entered into a contractual obligation to undertake and complete, within a reasonable time, a continuous program of construction or

modification.

"Commercial waste" means all types of solid waste generated by stores, offices, restaurants, warehouses, and other nonmanufacturing activities, excluding construction, household, and industrial wastes.

"Construction" means fabrication, erection, or installation of an affected facility.

"Controlled landfill" means any landfill at which collection and control systems are required under this article as a result of the nonmethane organic compounds emission rate. The landfill is considered controlled at the time a collection and control system design plan is submitted in compliance with 9 VAC 5-40-5820 C 2 a.

"Design capacity" means the maximum amount of solid waste a landfill can accept, as indicated in terms of volume or mass in the most recent permit issued by the department under Part VII (9 VAC 20-80-480 et seq.) of 9 VAC 20 Chapter 80 (Solid Waste Management Regulations), plus any in-place waste not accounted for in the most recent permit, or as calculated using good engineering practices acceptable to the board. If the owner chooses to convert the design capacity from volume to mass or from mass to volume to demonstrate that its design capacity is less than (i) 1.0 million megagrams or 1.0 million cubic meters in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 2.5 million megagrams or 2.5 million cubic meters in the remaining areas of the Commonwealth, the calculation must include a site-specific density, which must be recalculated annually.

"Disposal facility" means all contiguous land and structures, other appurtenances, and improvements on the land used for the disposal of solid waste.

"Emission rate cutoff" means the threshold annual emission rate to which a landfill compares its estimated emission rate to determine if control under the regulation is required.

"Enclosed combustor" means an enclosed firebox which maintains a relatively constant limited peak temperature generally using a limited supply of combustion air. An enclosed flare is considered an enclosed combustor.

"Federal operating permit" means a permit issued under Article 1 (9 VAC 5-80-50 et seq.) of Part II of 9 VAC 5 Chapter 80.

"Flare" means an open combustor without enclosure or shroud.

"Gas mover equipment" means the equipment (i.e., fan, blower, compressor) used to transport landfill gas through the header system.

"Household waste" mean any solid waste, including garbage, trash, and refuse, derived from households (including, but not limited to, single and multiple residences, hotels and motels, bunkhouses, ranger stations, crew quarters, campgrounds,

picnic grounds and day-use recreational areas). For the purposes of determining capacity as required by 9 VAC 5-40-5820 and NMOC emission rates as required by 9 VAC 5-40-5860, household waste includes sanitary waste (septage) in septic tanks.

"Industrial solid waste" means any solid waste generated by manufacturing or industrial processes that is not a hazardous waste regulated under subtitle C (42 USC 6921 et seq.) of RCRA (as reflected in 40 CFR parts 264 and 265) and implemented by the department in 9 VAC 20 Chapter 60 (9 VAC 20-60-10 et seq., Hazardous Waste Management Regulations). Such waste may include, but is not limited to, waste resulting from the following manufacturing processes: electric power generation; fertilizer and agricultural chemicals; food and related products and byproducts; inorganic chemicals; iron and steel manufacturing; leather and leather products; nonferrous metals manufacturing and foundries; organic chemicals; plastics and resins manufacturing; pulp and paper industry; rubber and miscellaneous plastic products; stone, glass, clay, and concrete products; textile manufacturing; transportation equipment; and water treatment. This term does not include mining waste or oil and gas waste.

"Interior well" means any well or similar collection component located inside the perimeter of the landfill waste. A perimeter well located outside the landfilled waste is not an interior well.

"Landfill" means an area of land or an excavation in which wastes are placed for permanent disposal, and that is not a land application unit, surface impoundment, injection well, or waste pile as those terms are defined under 9 VAC 20-80-10.

"Landfill gas" means any gas derived from the decomposition of organic waste deposited in an MSW landfill or from the evolution of volatile organic species in the waste. Emissions from MSW landfills is equivalent to landfill gas emissions.

"Lateral expansion" means a horizontal expansion of the waste boundaries of an existing MSW landfill. A lateral expansion is not a modification unless it results in an increase in the design capacity of the landfill.

"Modification" means an increase in the permitted volume design capacity of the landfill by either horizontal or vertical expansion based on its permitted design capacity as of May 30, 1991. Modification does not occur until the owner commences construction on the horizontal or vertical expansion.

"Municipal solid waste landfill" or "MSW landfill" means an entire disposal facility in a contiguous geographical space where household waste is placed in or on land. An MSW landfill may also receive other types of solid wastes regulated under subtitle D (42 USC 6941 et seq.) of RCRA (as reflected in 40 CFR 257.2) and implemented by the department in 9 VAC 20-80-250 (Solid Waste Management Regulations) such as commercial solid waste, nonhazardous sludge, conditionally exempt small quantity generator waste, and nonhazardous industrial solid waste. Portions of an MSW landfill may be separated by access roads. An MSW landfill may be publicly or privately owned. An MSW landfill may be a new MSW landfill, an existing MSW landfill, or a lateral expansion.

"Municipal solid waste landfill emissions" or "MSW landfill emissions" means gas generated by the decomposition of organic waste deposited in an MSW landfill or derived from the evolution of organic compounds in the waste.

"NMOC" means nonmethane organic compounds, as measured according to the provisions of 9 VAC 5-40-5860 B through E.

"Nondegradable waste" means any waste that does not decompose through chemical breakdown or microbiological activity. Examples include, but are not limited to, concrete, municipal waste combustor ash, and metals.

"Passive collection system" means a gas collection system that solely uses positive pressure within the landfill to move the gas rather than using gas mover equipment.

"RCRA" means the federal Resource Conservation and Recovery Act (42 USC 6901 et seq.).

"Refuse" means trash, rubbish, garbage, and other forms of solid or liquid waste, including, but not limited to, wastes resulting from residential, agricultural, commercial, industrial, institutional, trade, construction, land clearing, forest management, and emergency operations.

"Sludge" means any solid, semi-solid, or liquid waste generated from a municipal, commercial, or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility exclusive of the treated effluent from a wastewater treatment plant.

"Solid waste" means any garbage, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges that are point sources subject to permits under 33 USC 1342, or source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC 2011 et seq.). For more detail, see Part III (9 VAC 20-80-130 et seq.) of 9 VAC 20 Chapter 80 (Solid Waste Management Regulations).

"Sufficient density" means any number, spacing, and combination of collection system components, including vertical wells, horizontal collectors, and surface collectors, necessary to maintain emission and migration control as determined by measures of performance set forth in this part.

"Sufficient extraction rate" means a rate sufficient to maintain a negative pressure at all wellheads in the collection system without causing air infiltration, including any wellheads connected to the system as a result of expansion or excess surface emissions, for the life of the blower.

9 VAC 5-40-5820. Standard for air emissions.

A. This section shall apply to affected facilities that have accepted waste any time since November 8, 1987, or have additional design capacity available for future waste deposition, and meet the design capacity and emission rate applicability criteria in subdivisions A 1 or A 2 of this section.

1. For affected facilities located in the Northern Virginia Volatile Organic Compound Emissions Control Area as designated in 9 VAC 5-20-206:

a. A design capacity greater than or equal to 1.0 million megagrams and 1.0 million cubic meters; and

b. A nonmethane organic compound emission rate of 23 megagrams per year or more as determined using test procedures under 9 VAC 5-40-5860.

2. For affected facilities located in the remaining areas of the Commonwealth:

a. A design capacity greater than or equal to 2.5 million megagrams and 2.5 million cubic meters; and

b. A nonmethane organic compound emission rate of 50 megagrams per year or more as determined using test procedures under 9 VAC 5-40-5860.

B. Each owner of an MSW landfill having a design capacity less than (i) 1.0 million megagrams or 1.0 million cubic meters in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 2.5 million megagrams or 2.5 million cubic meters in the remaining areas of the Commonwealth, shall submit an initial design capacity report to the board as provided in 9 VAC 5-40-5880 C no later than June 30, 1999. The landfill may calculate design capacity in either megagrams or cubic meters for comparison with the design capacity applicability criteria in subsection A of this section. Any density conversions shall be documented and submitted with the report. Submittal of the initial design capacity report shall fulfill the requirements of this article except as provided for in subdivisions B 1 and B 2 of this section.

1. The owner shall submit to the board an amended design capacity report, as provided for in 9 VAC 5-40-5880 C 3. If the design capacity increase is the result of a modification, as defined in 9 VAC 5-40-5810 C, that was commenced on or after May 30, 1991, the landfill is subject to the new source performance standard in Article 5 of 9 VAC 5 Chapter 50 (9 VAC 5-50-410) instead of this article. If the design capacity increase is the result of a change in operating practices, density, or some other change that is not a modification, the landfill remains subject to this article.

2. When an increase in the maximum design capacity of a landfill exempted from the provisions of 9 VAC 5-40-5820 C, 9 VAC 5-40-5822, 9 VAC 5-40-

5824, 9 VAC 5-40-5850, 9 VAC 5-40-5860, 9 VAC 5-40-5870, 9 VAC 5-40-5880, and 9 VAC 5-40-5890 on the basis of the design capacity applicability criteria in subsection A of this section results in a revised maximum design capacity equal to or greater than (i) 1.0 million megagrams or 1.0 million cubic meters in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 2.5 million megagrams or 2.5 million cubic meters in the remaining areas of the Commonwealth, the owner shall comply with the provisions of subsection C of this section.

C. Each owner of an MSW landfill having a design capacity greater than or equal to (i) 1.0 million megagrams and 1.0 million cubic meters in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 2.5 million megagrams and 2.5 million cubic meters in the remaining areas of the Commonwealth shall either install a collection and control system as provided in subdivision C 2 of this section or calculate an initial NMOC emission rate for the landfill using the procedures specified in 9 VAC 5-40-5860. The NMOC emission rate shall be recalculated annually, except as provided in 9 VAC 5-40-5880 D 1 b.

1. If the calculated NMOC emission rate is less than (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth, the owner shall:

a. Submit an annual emission report to the board, except as provided for in 9 VAC 5-40-5880 D 1 b; and

b. Recalculate the NMOC emission rate annually using the procedures specified in 9 VAC 5-40-5860 B 1 until such time as the calculated NMOC emission rate is greater than or equal to (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth, or the landfill is closed.

(1) If the NMOC emission rate, upon initial calculation or annual recalculation required in subdivision C 1 b of this section, is greater than or equal to (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth, the owner shall install a collection and control system in compliance with subdivision C 2 of this section.

(2) If the landfill is permanently closed, a closure notification shall be submitted to the board as provided for in 9 VAC 5-40-5880 F.

2. If the calculated NMOC emission rate is greater than or equal to (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth, the owner shall:

a. Submit a collection and control system design plan prepared by a professional engineer to the board within one year:

(1) The collection and control system as described in the plan shall meet the design requirements of subdivision C 2 b of this section.

(2) The collection and control system design plan shall include any alternatives to the operational standards, test methods, procedures, compliance measures, monitoring, recordkeeping or reporting provisions of 9 VAC 5-40-5822, 9 VAC 5-40-5850, 9 VAC 5-40-5860, 9 VAC 5-40-5870, 9 VAC 5-40-5880, and 9 VAC 5-40-5890 proposed by the owner.

(3) The collection and control system design plan shall either conform with specifications for active collection systems in 9 VAC 5-40-5824 or include a demonstration to the board's satisfaction of the sufficiency of the alternative provisions to 9 VAC 5-40-5824.

(4) The board will review the information submitted under subdivisions C 2 a (1), (2) and (3) of this section and either approve it, disapprove it, or request that additional information be submitted. Because of the many site-specific factors involved with landfill gas system design, alternative systems may be necessary. A wide variety of system designs are possible, such as vertical wells, combination horizontal and vertical collection systems, or horizontal trenches only, leachate collection components, and passive systems. All design plan changes shall be submitted to the board and may be implemented only upon approval of the board.

b. Install a collection and control system that captures the gas generated within the landfill as required by subdivisions C 2 b (1) or (2) of this section within 30 months after the first annual report in which the emission rate equals or exceeds (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth, unless Tier 2 or Tier 3 sampling demonstrates that the emission rate is less than (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth, as specified in 9 VAC 5-40-5880 E 1 or E 2.

(1) An active collection system shall:

(a) Be designed to handle the maximum expected gas flow rate from the entire area of the landfill that warrants control over the intended use period of the gas control or treatment system equipment;

(b) Collect gas from each area, cell, or group of cells in the landfill in which the initial solid waste has been placed for a period of:

1 Five years or more if active; or

2 Two years or more if closed or at final grade;

(c) Collect gas at a sufficient extraction rate;

(d) Be designed to minimize off-site migration of subsurface gas.

(2) A passive collection system shall:

(a) Comply with the provisions specified in subdivisions C 2 b (1) (a), (1) (b), and (1) (d) of this section.

(b) Be installed with liners on the bottom and all sides in all areas in which gas is to be collected. The liners shall be installed as required under 9 VAC 20-80-250 B.

c. Route all the collected gas to a control system that complies with the requirements in either subdivision C 2 c (1), (2) or (3) of this section.

(1) An open flare designed and operated in accordance with 40 CFR 60.18;

(2) A control system designed and operated to reduce NMOC by 98 weight-percent, or, when an enclosed combustion device is used for control, to either reduce NMOC by 98 weight percent or reduce the outlet NMOC concentration to less than 20 parts per million by volume, dry basis as hexane at 3 percent oxygen. The reduction efficiency or parts per million by volume shall be established by an initial compliance test to be completed no later than 180 days after the initial startup of the approved control system using the test methods specified in 9 VAC 5-40-5860 E.

(a) If a boiler or process heater is used as the control device, the landfill gas stream shall be introduced into the flame zone.

(b) The control device shall be operated within the parameter ranges established during the initial or most recent compliance test. The operating parameters to be monitored are specified in 9 VAC 5-40-5870.

(3) Route the collected gas to a treatment system that processes the collected gas for subsequent sale or use. All emissions from any atmospheric vent from the gas treatment system shall be subject to the requirements of subdivision C 2 c (1) or (2) of this section.

d. Operate the collection and control device installed to comply with this article in accordance with the provisions of 9 VAC 5-40-5822, 9 VAC 5-40-5850, and 9 VAC 5-40-5870.

e. The collection and control system may be capped or removed provided that all the conditions of subdivisions C 2 e (1), (2), and (3) of this section are met:

(1) The landfill shall be a closed landfill as defined in 9 VAC

5-40-5810 and under the requirements of 9 VAC 20-80-250 E. A closure report shall be submitted to the board as provided in 9 VAC 5-40-5880 F;

(2) The collection and control system shall have been in operation a minimum of 15 years; and

(3) Following the procedures specified in 9 VAC 5-40-5860 C, the calculated NMOC gas produced by the landfill shall be less than (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth on three successive test dates. The test dates shall be no less than 90 days apart, and no more than 180 days apart.

D. When an MSW landfill subject to this article is closed, the owner is no longer subject to the requirement to maintain a federal operating permit for the landfill if the landfill is not otherwise subject to federal operating permit requirements if either of the following conditions are met:

1. The landfill was never subject to the requirement for a control system under 9 VAC 5-40-5820 C 2; or

2. The owner meets the conditions for control system removal specified in 9 VAC 5-40-5820 C 2 e.

9 VAC 5-40-5822. Operational standards for collection and control systems.

A. Each owner of an MSW landfill with a gas collection and control system used to comply with the provisions of 9 VAC 5-40-5820 C 2 b shall comply with the following requirements:

1. Operate the collection system such that gas is collected from each area, cell, or group of cells in the MSW landfill in which solid waste has been in place for:

a. Five years or more if active; or

b. Two years or more if closed or at final grade.

2. Operate the collection system with negative pressure at each wellhead except under the following conditions:

a. A fire or increased well temperature. The owner shall record instances when positive pressure occurs in efforts to avoid a fire. These records shall be submitted with the annual reports as provided in 9 VAC 5-40-5880 H 1;

b. Use of a geomembrane or synthetic cover. The owner shall develop acceptable pressure limits in the design plan; and

c. A decommissioned well. A well may experience a static

positive pressure after shut down to accommodate for declining flows.

3. Operate each interior wellhead in the collection system with a landfill gas temperature less than 55 degrees Celsius and with either a nitrogen level less than 20 percent or an oxygen level less than 5 percent. The owner may establish a higher operating temperature, nitrogen, or oxygen value at a particular well. A higher operating value demonstration shall show supporting data that the elevated parameter does not cause fires or significantly inhibit anaerobic decomposition by killing methanogens.

a. The nitrogen level shall be determined using Reference Method 3C in Appendix A of 40 CFR Part 60, unless an alternative method is established as allowed by 9 VAC 5-40-5820 C 2 a.

b. Unless an alternative method is established as allowed by 9 VAC 5-40-5820 C 2 a, the oxygen shall be determined by an oxygen meter using Reference Method 3A in Appendix A of 40 CFR Part 60 except that:

(1) The span shall be set so that the regulatory limit is between 20 and 50 percent of the span;

(2) A data recorder is not required;

(3) Only two calibration gases are required, a zero and span, and ambient air may be used as the span;

(4) A calibration error check is not required; and

(5) The allowable sample bias, zero drift, and calibration drift are " 10 percent.

4. Operate the collection system so that the methane concentration is less than 500 parts per million above background at the surface of the landfill. To determine if this level is exceeded, the owner shall conduct surface testing around the perimeter of the collection area and along a pattern that traverses the landfill at 30 meter intervals and where visual observations indicate elevated concentrations of landfill gas, such as distressed vegetation and cracks or seeps in the cover. The owner may establish an alternative traversing pattern that ensures equivalent coverage. A surface monitoring design plan shall be developed that includes a topographical map with the monitoring route and the rationale for any site-specific deviations from the 30 meter intervals. Areas with steep slopes or other dangerous areas may be excluded from the surface testing.

5. Operate the system such that all collected gases are vented to a control system designed and operated in compliance with 9 VAC 5-40-5820 C 2 c. In the event the collection or control system is inoperable, the gas mover system shall be shut down and all valves in the collection and control system contributing to venting of the gas to the atmosphere shall be closed within one hour.

6. Operate the control or treatment system at all times when the collected gas is routed to the system.

B. If monitoring demonstrates that the operational requirements in subdivision A 2, 3 or 4 of this section are not met, corrective action shall be taken as specified in 9 VAC 5-40-5850 C 3 through 5 or 9 VAC 5-40-5850 E. If corrective actions are taken as specified in 9 VAC 5-40-5850, the monitored exceedance is not a violation of the operational requirements in this section.

9 VAC 5-40-5824. Specifications for active collection systems.

A. Each owner seeking to comply with 9 VAC 5-40-5820 C 2 a shall site active collection wells, horizontal collectors, surface collectors, or other extraction devices at a sufficient density throughout all gas producing areas using the following procedures unless alternative procedures have been approved by the board as provided in 9 VAC 5-40-5820 C 2 a (3) and (4):

1. The collection devices within the interior and along the perimeter areas shall be certified to achieve comprehensive control of surface gas emissions by a professional engineer. The following issues shall be addressed in the design: depths of refuse, refuse gas generation rates and flow characteristics, cover properties, gas system expandibility, leachate and condensate management, accessibility, compatibility with filling operations, integration with closure end use, air intrusion control, corrosion resistance, fill settlement, and resistance to the refuse decomposition heat.

2. The sufficient density of gas collection devices determined in subdivision A 1 of this section shall address landfill gas migration issues and augmentation of the collection system through the use of active or passive systems at the landfill perimeter or exterior.

3. The placement of gas collection devices determined in subdivision A 1 of this section shall control all gas producing areas, except as provided by subdivisions A 3 a and A 3 b of this section.

a. Any segregated area of asbestos or nondegradable material may be excluded from collection if documented as provided under 9 VAC 5-40-5890 F. The documentation shall provide the nature, date of deposition, location and amount of asbestos or nondegradable material deposited in the area, and shall be provided to the board upon request.

b. Any nonproductive area of the landfill may be excluded from control, provided that the total of all excluded areas can be shown to contribute less than 1 percent of the total amount of NMOC emissions from the landfill. The amount, location, and age of the material shall be documented and provided to the board upon request. A separate NMOC emissions estimate shall be made for each section proposed for exclusion, and the sum of all such sections shall be compared to the NMOC emissions estimate for the entire landfill. Emissions from each section shall be computed using the following equation:

$$Q_i = 2\ k\ L_0\ M_i\ (e^{-k\ t_i})\ (C_{NMOC})\ (3.6x\ 10^{-9})$$

where:

Q_i	=	NMOC emission rate from the i^{th} section, megagrams per year
k	=	methane generation rate constant, $year^{-1}$
L_0	=	methane generation potential, cubic meters per megagram solid waste
M_i	=	mass of the degradable solid waste in the i^{th} section, megagrams
t_i	=	age of the solid waste in the i^{th} section, years
C_{NMOC}	=	concentration of nonmethane organic compounds, parts per million by volume
3.6×10^{-9}	=	conversion factor

The values for k and C_{NMOC} determined in field testing shall be used, if field testing has been performed in determining the NMOC emission rate or the radii of influence (this is distance from the well center to a point in the landfill where the pressure gradient applied by the blower or compressor approaches zero). If field testing has not been performed, the default values for k, L_0 and C_{NMOC} provided in 9 VAC 5-40-5860 B 1 or the alternative values from 9 VAC 5-40-5860 B 5 shall be used. The mass of nondegradable solid waste contained within the given section may be subtracted from the total mass of the section when estimating emissions provided the nature, location, age, and amount of the nondegradable material is documented as provided in subdivision A 3 a of this section.

B. Each owner seeking to comply with 9 VAC 5-40-5820 C 2 a (1) shall construct the gas collection devices using the following equipment or procedures:

1. The landfill gas extraction components shall be constructed of polyvinyl chloride (PVC), high density polyethylene (HDPE) pipe, fiberglass, stainless steel, or other nonporous, corrosion-resistant material of suitable dimensions to: convey projected amounts of gases; withstand installation, static, and settlement forces; and withstand planned overburden or traffic loads. The collection system shall extend as necessary to comply with emission and migration standards. Collection devices such as wells and horizontal collectors shall be perforated to allow gas entry without head loss sufficient to impair performance across the intended extent of control. Perforations shall be situated with regard to the need to prevent excessive air infiltration.

2. Vertical wells shall be placed so as not to endanger underlying liners and shall address the occurrence of water within the landfill. Holes and trenches constructed for piped wells and horizontal collectors shall be of sufficient cross-section so as to allow for their proper construction and completion including, for example, centering of pipes and placement of gravel backfill. Collection devices shall be designed so as not to allow indirect short circuiting of air into the cover or refuse into the collection system or gas into the air. Any gravel used around pipe perforations should be of a dimension so as not to penetrate or block perforations.

3. Collection devices may be connected to the collection header pipes below or above the landfill surface. The connector assembly shall include a positive closing throttle valve, any necessary seals and couplings, access couplings and at least one sampling port. The collection devices shall be constructed of PVC, HDPE, fiberglass, stainless steel, or other nonporous material of suitable thickness.

C. Each owner seeking to comply with 9 VAC 5-40-5820 C 2 a (1) shall convey the landfill gas to a control system in compliance with 9 VAC 5-40-5820 C 2 c through the collection header pipe(s). The gas mover equipment shall be sized to handle the maximum gas generation flow rate expected over the intended use period of the gas moving equipment using the following procedures:

1. For existing collection systems, the flow data shall be used to project the maximum flow rate. If no flow data exists, the procedures in subdivision C 2 of this section shall be used.

2. For new collection systems, the maximum flow rate shall be in accordance with 9 VAC 5-40-5850 C 1.

9 VAC 5-40-5830. Standard for fugitive dust/emissions.

The provisions of Article 1 (9 VAC 5-40-60 et seq.) of this chapter (Emission Standards for Visible Emissions and Fugitive Dust/Emissions, Rule 4-1) apply.

9 VAC 5-40-5840. Standard for odor.

The provisions of Article 2 (9 VAC 5-40-130 et seq.) of this chapter (Emission Standards for Odor, Rule 4-2) apply.

9 VAC 5-40-5850. Compliance.

A. The provisions of 9 VAC 5-40-20 (Compliance) apply.

B. Owners subject to 9 VAC 5-40-5820 shall comply with the provisions of Part V (9 VAC 20-80-240 et seq.) of 9 VAC 20 Chapter 80 (Solid Waste Management Regulations) pertaining to the control of landfill gases.

C. Except as provided in 9 VAC 5-40-5820 C 2 a (2), the specified methods in subdivisions C 1 through C 6 of this section shall be used to determine whether the gas collection system is in compliance with 9 VAC 5-40-5820 C 2 b.

1. For the purposes of calculating the maximum expected gas generation flow rate from the landfill to determine compliance with 9 VAC 5-40-5820 C 2 b (1) (a), one of the following equations shall be used. The k and L_0 kinetic factors should be those published in the "Compilation of Air Pollutant Emission Factors (AP-42)" (see 9 VAC 5-20-21) or other site-specific values demonstrated to be appropriate and approved by the board. If k has been determined as specified in 9 VAC 5-40-5860 B 4, the value of

k determined from the test shall be used. A value of no more than 15 years shall be used for the intended use period of the gas mover equipment. The active life of the landfill is the age of the landfill plus the estimated number of years until closure.

a. For sites with unknown year-to-year solid waste acceptance rate:

$$Q_M = 2 L_0 R(e^{-kc} - e^{-kt})$$

where

Q_M = maximum expected gas generation flow rate, cubic meters per year
L_0 = methane generation potential, cubic meters per megagram solid waste
R = average annual acceptance rate, megagrams per year
k = methane generation rate constant, $year^{-1}$
t = age of the landfill at equipment installation plus the time the owner intends to use the gas mover equipment or active life of the landfill, whichever is less. If the equipment is installed after closure, t is the age of the landfill at installation, years
c = time since closure, years (for an active landfill c = 0 and $e^{-kc} = 1$)

b. For sites with known year-to-year solid waste acceptance rate:

$$Q_M = \sum_{i=1}^{n} 2 k L_0 M_i (e^{-k t_i})$$

where

Q_M = maximum expected gas generation flow rate, cubic meters per year
k = methane generation rate constant, $year^{-1}$
L_0 = methane generation potential, cubic meters per megagram solid waste
M_i = mass of solid waste in the i^{th} section, megagrams
t_i = age of the i^{th} section, years

c. If a collection and control system has been installed, actual flow data may be used to project the maximum expected gas generation flow rate instead of, or in conjunction with, the equations in subdivisions C 1 a and b of this section. If the landfill is still accepting waste, the actual measured flow data will not equal the maximum expected gas generation rate, so calculations using the equations in subdivisions C 1 a or b of this section or other methods acceptable to the board shall be used to predict the maximum expected gas generation rate over the intended period of use of the gas control system equipment.

2. For the purposes of determining sufficient density of gas collectors for

compliance with 9 VAC 5-40-5820 C 2 b (1) (b), the owner shall design a system of vertical wells, horizontal collectors, or other collection devices, acceptable to the board, capable of controlling and extracting gas from all portions of the landfill sufficient to meet all operational and performance standards.

3. For the purpose of demonstrating whether the gas collection system flow rate is sufficient to determine compliance with 9 VAC 5-40-5820 C 2 b (1) (c), the owner shall measure gauge pressure in the gas collection header at each individual well, monthly. If a positive pressure exists, action shall be initiated to correct the exceedance within five calendar days, except for the three conditions allowed under 9 VAC 5-40-5822 A 2. If negative pressure cannot be achieved without excess air infiltration within 15 calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial measurement of positive pressure. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedance may be submitted to the board for approval.

4. Owners are not required to expand the system as required in subdivision C 3 of this section during the first 180 days after gas collection system startup.

5. For the purpose of identifying whether excess air infiltration into the landfill is occurring, the owner shall monitor each well monthly for temperature and nitrogen or oxygen as provided in 9 VAC 5-40-5822 A 3. If a well exceeds one of these operating parameters, action shall be initiated to correct the exceedance within five calendar days. If correction of the exceedance cannot be achieved within 15 calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial exceedance. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedance may be submitted to the board for approval.

6. An owner seeking to demonstrate compliance with 9 VAC 5-40-5820 C 2 b (1) (d) through the use of a collection system not conforming to the specifications provided in 9 VAC 5-40-5824 shall provide information acceptable to the board as specified in 9 VAC 5-40-5820 C 2 a (3) demonstrating that off-site migration is being controlled.

D. For purposes of compliance with 9 VAC 5-40-5822 A 1, each owner of a controlled landfill shall place each well or design component as specified in the approved design plan as provided in 9 VAC 5-40-5820 C 2 a. Each well shall be installed no later than 60 days after the date on which the initial solid waste has been in place for a period of:

1. Five years or more if active; or

2. Two years or more if closed or at final grade.

E. The following procedures shall be used for compliance with the surface methane operational standard as provided in 9 VAC 5-40-5822 A 4.

1. After installation of the collection system, the owner shall monitor surface concentrations of methane along the entire perimeter of the collection area and along a pattern that traverses the landfill at 30-meter intervals (or a site-specific established spacing) for each collection area on a quarterly basis using an organic vapor analyzer, flame ionization detector, or other portable monitor meeting the specifications provided in subsection F of this section.

2. The background concentration shall be determined by moving the probe inlet upwind and downwind outside the boundary of the landfill at a distance of at least 30 meters from the perimeter wells.

3. Surface emission monitoring shall be performed in accordance with section 4.3.1 of Reference Method 21 of Appendix A of 40 CFR Part 60, except that the probe inlet shall be placed within 5 to 10 centimeters of the ground. Monitoring shall be performed during typical meteorological conditions.

4. Any reading of 500 parts per million or more above background at any location shall be recorded as a monitored exceedance and the actions specified in subdivisions E 4 a through e of this section shall be taken. As long as the specified actions are taken, the exceedance is not a violation of the operational requirements of 9 VAC 5-40-5822 A 4.

a. The location of each monitored exceedance shall be marked and the location recorded.

b. Cover maintenance or adjustments to the vacuum of the adjacent wells to increase the gas collection in the vicinity of each exceedance shall be made and the location shall be re-monitored within 10 calendar days of detecting the exceedance.

c. If the re-monitoring of the location shows a second exceedance, additional corrective action shall be taken and the location shall be monitored again within 10 days of the second exceedance. If the re-monitoring shows a third exceedance for the same location, the action specified in subdivision E 4 e of this section shall be taken, and no further monitoring of that location is required until the action specified in subdivision E 4 e of this section has been taken.

d. Any location that initially showed an exceedance but has a methane concentration less than 500 parts per million methane above background at the 10-day re-monitoring specified in subdivision E 4 b or c of this section shall be re-monitored one month from the initial exceedance. If the one-month remonitoring shows a concentration less than 500 parts per million above background, no further monitoring of that location is required until the next quarterly monitoring period. If the 1-month remonitoring shows an exceedance, the actions specified in subdivision E 4 c or e of this section shall be taken.

e. For any location where monitored methane concentration

equals or exceeds 500 parts per million above background three times within a quarterly period, a new well or other collection device shall be installed within 120 calendar days of the initial exceedance. An alternative remedy to the exceedance, such as upgrading the blower, header pipes or control device, and a corresponding timeline for installation may be submitted to the board for approval.

5. The owner shall implement a program to monitor for cover integrity and implement cover repairs as necessary on a monthly basis.

F. Each owner seeking to comply with the provisions in subsection E of this section shall comply with the following instrumentation specifications and procedures for surface emission monitoring devices:

1. The portable analyzer shall meet the instrument specifications provided in section 3 of Reference Method 21 of Appendix A of 40 CFR Part 60, except that "methane" shall replace all references to VOC.

2. The calibration gas shall be methane, diluted to a nominal concentration of 500 parts per million in air.

3. To meet the performance evaluation requirements in section 3.1.3 of Reference Method 21 of Appendix A of 40 CFR Part 60, the instrument evaluation procedures of section 4.4 of Reference Method 21 of Appendix A of 40 CFR Part 60 shall be used.

4. The calibration procedures provided in section 4.2 of Reference Method 21 of Appendix A of 40 CFR Part 60 shall be followed immediately before commencing a surface monitoring survey.

G. The provisions of this article apply at all times, except during periods of startup, shutdown, or malfunction, provided that the duration of startup, shutdown, or malfunction shall not exceed five days for collection systems and shall not exceed one hour for treatment or control devices. This subsection shall not apply to the emission standards set forth in 9 VAC 5-40-5830 and 9 VAC 5-40-5840.

H. With regard to startup, shutdown, and malfunction, the provisions of 9 VAC 5-40-5850 A and 9 VAC 5-40-5910 shall apply to the emission standards set forth in 9 VAC 5-40-5830 and 9 VAC 5-40-5840.

9 VAC 5-40-5855. Compliance schedule.

A. Except as provided for under subdivision B of this section, the owner of a municipal solid waste landfill subject to this article located outside the Northern Virginia Volatile Organic Compound Emissions Control Area and with a design capacity greater than or equal to 2.5 million megagrams and 2.5 million cubic meters shall plan, award contracts, and install emission collection and control equipment capable of meeting the standards established under 9 VAC 5-40-5820 within specific periods after the date the initial NMOC emission rate report under 9 VAC 5-40-5880 D 1 a shows NMOC emissions

equal or exceed 50 megagrams per year, as follows:

1. The collection and control design plan shall be submitted to the board within 12 months.

2. Construction contracts shall be awarded within 18 months.

3. Construction shall be initiated within 20 months.

4. Construction shall be completed within 28 months.

5. Final compliance shall be achieved within 30 months after the date the initial annual emission rate report shows NMOC emissions greater than or equal to 50 megagrams per year.

B. For each MSW landfill located outside of the Northern Virginia Volatile Organic Compound Emissions Control Area with a design capacity of 2.5 million megagrams and 2.5 million cubic meters and with an NMOC rate less than 50 megagrams per year on April 1, 1999, installation of collection and control systems capable of meeting the standards established under 9 VAC 5-40-5820 shall be accomplished within 30 months of the date when the condition in 9 VAC 5-40-5820 C is met (i.e., the date of the first annual NMOC emission rate which equals or exceeds 50 megagrams per year), as follows:

1. The collection and control design plan shall be submitted to the board within 12 months.

2. Construction contracts shall be awarded within 18 months.

3. Construction shall be initiated within 20 months.

4. Construction shall be completed within 28 months.

5. Final compliance shall be achieved within 30 months after the date the initial annual emission rate report shows NMOC emissions greater than or equal to 50 megagrams per year.

C. Except as provided for under subdivision D of this section, the owner of a municipal solid waste landfill subject to this article in the Northern Virginia Volatile Organic Compound Emissions Control Area, with a design capacity greater than or equal to 1.0 million megagrams and 1.0 million cubic meters, shall plan, award contracts, and install emission collection and control equipment capable of meeting the standards established under 9 VAC 5-40-5820 by December 30, 1999 provided the initial NMOC emission rate report shows NMOC emissions equal or exceed 23 megagrams per year.

D. For each MSW landfill in the Northern Virginia Volatile Organic Compound Emissions Control Area, with a design capacity greater than or equal to 1.0 million megagrams and 1.0 million cubic meters, and with an NMOC rate less than 23

megagrams per year on April 1, 1999, installation of collection and control systems capable of meeting the standards established under 9 VAC 5-40-5820 shall be accomplished within 30 months of the date when the condition in 9 VAC 5-40-5820 C is met (i.e., the date of the first annual NMOC emission rate which equals or exceeds 23 megagrams per year), as follows:

1. The collection and control design plan shall be submitted to the board within 12 months.

2. Construction contracts shall be awarded within 18 months.

3. Construction shall be initiated within 20 months.

4. Construction shall be completed within 28 months.

5. Final compliance shall be achieved within 30 months after the date the initial annual emission rate report shows NMOC emissions greater than or equal to 23 megagrams per year.

9 VAC 5-40-5860. Test methods and procedures.

A. The provisions of 9 VAC 5-40-30 (Emission Testing) or 40 CFR 60.8, whichever is more restrictive, apply.

B.1. The owner shall calculate the NMOC emission rate using either the equation provided in subdivision B 1 a of this section or the equation provided in subdivision B 1 b of this section. Both equations may be used if the actual year-to-year solid waste acceptance rate is known, as specified in subdivision B 1 a of this section, for part of the life of the landfill and the actual year-to-year solid waste acceptance rate is unknown, as specified in subdivision B 1 b of this section, for part of the life of the landfill. The values to be used in both equations are 0.05 per year for k, 170 cubic meters per megagram for L_0, and 4,000 parts per million by volume as hexane for the C_{NMOC}. For landfills located in geographical areas with a 30-year average annual precipitation of less than 25 inches, as measured at the nearest representative official meteorological site, the k value to be used is 0.02 per year.

a. The following equation shall be used if the actual year-to-year solid waste acceptance rate is known.

$$M_{NMOC} = \sum_{i=1}^{n} 2k\, L_0\, M_i\, (e^{-k\, t_i})(C_{NMOC})(3.6x10^{-9})$$

where

M_{NMOC} = Total NMOC emission rate from the landfill, megagrams per year

k = methane generation rate constant, $year^{-1}$

L_0	=	methane generation potential, cubic meters per megagram solid waste
M_i	=	mass of solid waste in the i^{th} section, megagrams
t_i	=	age of the i^{th} section, years
C_{NMOC}	=	concentration of NMOC, parts per million by volume as hexane
3.6×10^{-9}	=	conversion factor

The mass of nondegradable solid waste may be subtracted from the total mass of solid waste in a particular section of the landfill when calculating the value for M_i if documentation of the nature and amounts of such wastes is obtained.

b. The following equation shall be used if the actual year-to-year solid waste acceptance rate is unknown.

$$M_{NMOC} = 2 L_0 R (e^{-kc} - e^{-kt})(C_{NMOC})(3.6 \times 10^{-9})$$

where

M_{NMOC}	=	mass emission rate of NMOC, megagrams per year
L_0	=	methane generation potential, cubic meters per megagram solid waste
R	=	average annual acceptance rate, megagrams per year
k	=	methane generation rate constant, $year^{-1}$
t	=	age of landfill, years
C_{NMOC}	=	concentration of NMOC, parts per million by volume as hexane
c	=	time since closure, years. For active landfill c = 0 and $e^{-kc} = 1$
3.6×10^{-9}	=	conversion factor

The mass of nondegradable solid waste may be subtracted from the total mass of solid waste in a particular section of the landfill when calculating the value of R, if documentation of the nature and amounts of such wastes is maintained.

2. Tier 1. The owner shall compare the calculated NMOC mass emission rate to the following emission rate applicability criteria: (i) in the Northern Virginia Volatile Organic Compound Emissions Control Area, 23 megagrams per year, or (ii) in the remaining areas of the Commonwealth, 50 megagrams per year.

a. If the NMOC emission rate calculated in subdivision B 1 of this section is less than (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth, then the owner shall submit an emission rate report as provided in 9 VAC 5-40-5880 D 1, and shall recalculate the NMOC mass emission rate annually as required under 9 VAC 5-40-5820 C 1.

b. If the calculated NMOC emission rate is greater than or equal to (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the

Commonwealth, then the owner shall either comply with 9 VAC 5-40-5820 C 2, or determine a site-specific NMOC concentration and recalculate the NMOC emission rate using the procedures provided in subdivision B 3 of this section.

3. Tier 2. The owner shall determine the NMOC concentration using the following sampling procedure. The owner shall install at least two sample probes per hectare of landfill surface that has retained waste for at least two years. If the landfill is larger than 25 hectares in area, only 50 samples are required. The sample probes should be located to avoid known areas of nondegradable solid waste. The owner shall collect and analyze one sample of landfill gas from each probe to determine the NMOC concentration using Reference Method 25C of Appendix A of 40 CFR Part 60 or Reference Method 18 of Appendix A of 40 CFR Part 60. If using Reference Method 18 of Appendix A of 40 CFR Part 60, the minimum list of compounds to be tested shall be those published in the "Compilation of Air Pollutant Emission Factors (AP-42)" (see 9 VAC 5-20-21). If composite sampling is used, equal volumes shall be taken from each sample probe. If more than the required number of samples are taken, all samples shall be used in the analysis. The owner shall divide the NMOC concentration from Reference Method 25C of Appendix A of 40 CFR Part 60 by six to convert from C_{NMOC} as carbon to C_{NMOC} as hexane.

a. The owner shall recalculate the NMOC mass emission rate using the equations provided in subdivision B 1 a or B 1 b of this section and using the average NMOC concentration from the collected samples instead of the default value in the equation provided in subdivision B 1 of this section.

b. If the resulting mass emission rate calculated using the site-specific NMOC concentration is greater than or equal to (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth, then the owner shall either comply with 9 VAC 5-40-5820 C 2, or determine the site-specific methane generation rate constant and recalculate the NMOC emission rate using the site-specific methane generation rate using the procedure specified in subdivision B 4 of this section.

c. If the resulting NMOC mass emission rate is less than (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth, the owner shall submit a periodic estimate of the emission rate report as provided in 9 VAC 5-40-5880 D 1 and retest the site-specific NMOC concentration every five years using the methods specified in this section.

4. Tier 3. The site-specific methane generation rate constant shall be determined using the procedures provided in Reference Method 2E of Appendix A of 40 CFR Part 60. The owner shall estimate the NMOC mass emission rate using equations in subdivision B 1 a or B 1 b of this section and using a site-specific methane generation rate constant k, and the site-specific NMOC concentration as determined in subdivision B 3 of this section instead of the default values provided in subdivision B 1 of this section. The owner shall compare the resulting NMOC mass emission rate to the following emission rate applicability criteria: (i) in the Northern Virginia Volatile Organic Compound Emissions Control Area, 23 megagrams per year, or (ii) in the remaining areas of the Commonwealth,

50 megagrams per year.

a. If the NMOC mass emission rate as calculated using the site-specific methane generation rate and concentration of NMOC is greater than or equal to (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth, the owner shall comply with 9 VAC 5-40-5820 C 2.

b. If the NMOC mass emission rate is less than (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth, then the owner shall submit a periodic emission rate report as provided in 9 VAC 5-40-5880 D 1 and shall recalculate the NMOC mass emission rate annually, as provided in 9 VAC 5-40-5880 D 1 using the equations in subdivision B 1 of this section and using the site-specific methane generation rate constant and NMOC concentration obtained in subdivision B 3 of this section. The calculation of the methane generation rate constant is performed only once, and the value obtained from this test shall be used in all subsequent annual NMOC emission rate calculations.

5. The owner may use other methods to determine the NMOC concentration or a site-specific k as an alternative method required in subdivisions B 3 and B 4 of this section if the method has been approved by the board.

C. After the installation of a collection and control system in compliance with 9 VAC 5-40-5850, the owner shall calculate the NMOC emission rate for purposes of determining when the system can be removed as provided in 9 VAC 5-40-5820 C 2 e, using the following equation:

$$M_{NMOC} = 1.89x10^{-3} Q_{LFG} C_{NMOC}$$

where

M_{NMOC}	=	mass emission rate of NMOC, megagrams per year
Q_{LFG}	=	flow rate of landfill gas, cubic meters per minute
C_{NMOC}	=	NMOC concentration, parts per million by volume as hexane

1. The flow rate of landfill gas, Q_{LFG}, shall be determined by measuring the total landfill gas flow rate at the common header pipe that leads to the control device using a gas flow measuring device calibrated according to the provisions of section 4 of Reference Method 2E of Appendix A of 40 CFR Part 60.

2. The average NMOC concentration, C_{NMOC}, shall be determined by collecting and analyzing landfill gas sampled from the common header pipe before the gas moving or condensate removal equipment using the procedures in Reference Method 25C or Reference Method 18 of Appendix A of 40 CFR Part 60. If using Reference Method 18 of Appendix A of 40 CFR Part 60, the minimum list of compounds to be tested shall be those published in the "Compilation of Air Pollutant Emission Factors (AP-42)" (see 9

VAC 5-20-21). The sample location on the common header pipe shall be before any condensate removal or other gas refining units. The owner shall divide the NMOC concentration from Reference Method 25C of Appendix A of 40 CFR Part 60 by six to convert from C_{NMOC} as carbon to C_{NMOC} as hexane.

3. The owner may use an alternative method to determine landfill gas flow rate and NMOC concentration if the method has been approved by the board.

D. When calculating emissions for prevention of significant deterioration purposes, the owner of each MSW landfill subject to the provisions of this article shall estimate the NMOC emission rate for comparison to the prevention of significant deterioration major source and significance levels in Article 8 (9 VAC 5-80-1700 et seq.) of 9 VAC 5 Chapter 80 using the "Compilation of Air Pollutant Emission Factors (AP-42)" (see 9 VAC 5-20-21) or other measurement procedures acceptable to the board. If a collection system, which complies with the provisions in 9 VAC 5-40-5820 C 2 is already installed, the owner shall estimate the NMOC emission rate using the procedures provided in subsection C of this section.

E. For the compliance test required in 9 VAC 5-40-5820 C 2 c (2), Reference Method 25 or Reference Method 18 of Appendix A of 40 CFR Part 60 shall be used to determine compliance with 98 weight-percent efficiency or the 20 ppmv outlet concentration level, unless an alternative method to demonstrate compliance has been approved by the board as provided by 9 VAC 5-40-5820 C 2 a (2). If using Reference Method 18 of Appendix A of 40 CFR Part 60, the minimum list of compounds to be tested shall be those published in the "Compilation of Air Pollutant Emission Factors (AP-42)" (see 9 VAC 5-20-21). The following equation shall be used to calculate efficiency:

$$Control\ Efficiency = (NMOC_{in} - NMOC_{out})/(NMOC_{in})$$

where

$NMOC_{in}$ = mass of NMOC entering control device
$NMOC_{out}$ = mass of NMOC exiting control device

9 VAC 5-40-5870. Monitoring.

A. The provisions of 9 VAC 5-40-40 (Monitoring) apply.

B. Except as provided in 9 VAC 5-40-5820 C 2 a (2), the provisions of subsections C through H of this section apply.

C. Each owner seeking to comply with 9 VAC 5-40-5820 C 2 b (1) for an active gas collection system shall install a sampling port and a thermometer, other temperature measuring device, or an access port for temperature measurements at each wellhead and:

1. Measure the gauge pressure in the gas collection header on a monthly basis as provided in 9 VAC 5-40-5850 C 3; and

2. Monitor nitrogen or oxygen concentration in the landfill gas on a monthly basis as provided in 9 VAC 5-40-5850 C 5; and

3. Monitor temperature of the landfill gas on a monthly basis as provided in 9 VAC 5-40-5850 C 5.

D. Each owner seeking to comply with 9 VAC 5-40-5820 C 2 c using an enclosed combustor shall calibrate, maintain, and operate according to the manufacturer's specifications, the following equipment.

1. A temperature monitoring device equipped with a continuous recorder and having a minimum accuracy of "1 percent of the temperature being measured expressed in degrees Celsius or "0.5 degrees Celsius, whichever is greater. A temperature monitoring device is not required for boilers or process heaters with design heat input capacity equal to or greater than 44 megawatts.

2. A device that records flow to or bypass of the control device. The owner shall either:

a. Install, calibrate, and maintain a gas flow rate measuring device that shall record the flow to the control device at least every 15 minutes; or

b. Secure the bypass line valve in the closed position with a car-seal or a lock-and-key type configuration. A visual inspection of the seal or closure mechanism shall be performed at least once every month to ensure that the valve is maintained in the closed position and that the gas flow is not diverted through the bypass line.

E. Each owner seeking to comply with 9 VAC 5-40-5820 C 2 c using an open flare shall install, calibrate, maintain, and operate according to the manufacturer's specifications the following equipment:

1. A heat sensing device, such as an ultraviolet beam sensor or thermocouple, at the pilot light or the flame itself to indicate the continuous presence of a flame.

2. A device that records flow to or bypass of the flare. The owner shall either:

a. Install, calibrate, and maintain a gas flow rate measuring device that shall record the flow to the control device at least every 15 minutes; or

b. Secure the bypass line valve in the closed position with a car-seal or a lock-and-key type configuration. A visual inspection of the seal or closure mechanism shall be performed at least once every month to ensure that the valve is maintained in the closed position and that the gas flow is not diverted through the bypass

line.

F. Each owner seeking to demonstrate compliance with 9 VAC 5-40-5820 C 2 c using a device other than an open flare or an enclosed combustor shall provide information acceptable to the board as provided in 9 VAC 5-40-5820 C 2 a (2) describing the operation of the control device, the operating parameters that would indicate proper performance, and appropriate monitoring procedures. The board will review the information and either approve it, or request that additional information be submitted. The board may specify additional appropriate monitoring procedures.

G. Each owner seeking to install a collection system that does not meet the specifications in 9 VAC 5-40-5824 or seeking to monitor alternative parameters to those required by 9 VAC 5-40-5822, 9 VAC 5-40-5850, 9 VAC 5-40-5860, and 9 VAC 5-40-5870 shall provide information acceptable to the board as provided in 9 VAC 5-40-5820 C 2 a (2) and (3) describing the design and operation of the collection system, the operating parameters that would indicate proper performance, and appropriate monitoring procedures. The board may specify additional appropriate monitoring procedures.

H. Each owner seeking to demonstrate compliance with 9 VAC 5-40-5850 E, shall monitor surface concentrations of methane according to the instrument specifications and procedures provided in 9 VAC 5-40-5850 F. Any closed landfill that has no monitored exceedances of the operational standard in three consecutive quarterly monitoring periods may skip to annual monitoring. Any methane reading of 500 parts per million or more above background detected during the annual monitoring returns the frequency for that landfill to quarterly monitoring.

9 VAC 5-40-5880. Reporting.

A. The provisions of 9 VAC 5-40-50 (Notification, records and reporting) apply.

B. Except as provided in 9 VAC 5-40-5820 C 2 a (2), the provisions of subsections C through I of this section apply.

C. Each owner subject to the requirements of this article shall submit an initial design capacity report to the board.

1. The initial design capacity report shall be submitted no later than June 30, 1999.

2. The initial design capacity report shall contain the following information:

a. A map or plot of the landfill, providing the size and location of the landfill, and identifying all areas where solid waste may be landfilled according to the permit issued by the department under Part VII (9 VAC 20-80-480 et seq.) of 9 VAC 20 Chapter 80 (Solid Waste Management Regulations);

b. The maximum design capacity of the landfill. Where the

maximum design capacity is specified in a permit issued by the department under Part VII (9 VAC 20-80-480 et seq.) of 9 VAC 20 Chapter 80 (Solid Waste Management Regulations), a copy of the permit specifying the maximum design capacity may be submitted as part of the report. If the maximum design capacity of the landfill is not specified in the permit, the maximum design capacity shall be calculated using good engineering practices acceptable to the board. The calculations shall be provided, along with the relevant parameters as part of the report. The board may request other reasonable information as may be necessary to verify the maximum design capacity of the landfill.

3. An amended design capacity report shall be submitted to the board providing notification of an increase in the design capacity of the landfill, within 90 days of an increase in the maximum design capacity of the landfill to or above (i) 1.0 million megagrams and 1.0 million cubic meters in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 2.5 million megagrams and 2.5 million cubic meters in the remaining areas of the Commonwealth. This increase in design capacity may result from an increase in the permitted volume of the landfill or an increase in the density as documented in the annual recalculation required in 9 VAC 5-40-5890 H.

D. Each owner subject to the requirements of this article shall submit an NMOC emission rate report to the board initially and annually thereafter, except as provided for in subdivisions D 1 b or D 3 of this section. The board may request such additional information as may be necessary to verify the reported NMOC emission rate.

1. The NMOC emission rate report shall contain an annual or 5-year estimate of the NMOC emission rate calculated using the formula and procedures provided in 9 VAC 5-40-5860 B or C, as applicable.

a. The initial NMOC emission rate report shall be submitted by June 30, 1999 and may be combined with the initial design capacity report required in subsection C of this section. Subsequent NMOC emission rate reports shall be submitted annually thereafter, except as provided for in subdivisions D 1 b and D 3 of this section.

b. If the estimated NMOC emission rate as reported in the annual report to the board is less than (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth, in each of the next five consecutive years, the owner may elect to submit an estimate of the NMOC emission rate for the next 5-year period in lieu of the annual report. This estimate shall include the current amount of solid waste-in-place and the estimated waste acceptance rate for each year of the five years for which an NMOC emission rate is estimated. All data and calculations upon which this estimate is based shall be provided to the board. This estimate shall be revised at least once every five years. If the actual waste acceptance rate exceeds the estimated waste acceptance rate in any year reported in the 5-year estimate, a revised 5-year estimate shall be submitted to the board. The revised estimate shall cover the 5-year period beginning with the year in which the actual waste acceptance rate exceeded the estimated waste acceptance rate.

2. The NMOC emission rate report shall include all the data, calculations, sample reports and measurements used to estimate the annual or 5-year emissions.

3. Each owner subject to the requirements of this article is exempted from the requirements of subdivisions D 1 and 2 of this section, after the installation of a collection and control system in compliance with 9 VAC 5-40-5820 C 2, during such time as the collection and control system is in operation and in compliance with 9 VAC 5-40-5822 and 9 VAC 5-40-5850.

E. Each owner subject to the provisions of 9 VAC 5-40-5820 C 2 a shall submit a collection and control system design plan to the board within one year of the first report, required under subdivision D of this section, in which the emission rate is greater than or equal to (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth, except as follows:

1. If the owner elects to recalculate the NMOC emission rate after Tier 2 NMOC sampling and analysis as provided in 9 VAC 5-40-5860 B 3 and the resulting rate is less than (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth, annual periodic reporting shall be resumed, using the Tier 2 determined site-specific NMOC concentration, until the calculated emission rate is greater than or equal to (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth, or the landfill is closed. The revised NMOC emission rate report, with the recalculated emission rate based on NMOC sampling and analysis, shall be submitted within 180 days of the first calculated exceedance of the emission rate applicability criteria.

2. If the owner elects to recalculate the NMOC emission rate after determining a site-specific methane generation rate constant (k), as provided in Tier 3 in 9 VAC 5-40-5860 B 4, and the resulting NMOC emission rate is less than (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth, annual periodic reporting shall be resumed. The resulting site-specific methane generation rate constant (k) shall be used in the emission rate calculation until such time as the emissions rate calculation results in an exceedance. The revised NMOC emission rate report based on the provisions of 9 VAC 5-40-5860 B 4 and the resulting site-specific methane generation rate constant (k) shall be submitted to the board within one year of the first calculated emission rate exceeding (i) 23 megagrams per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams per year in the remaining areas of the Commonwealth.

F. Each owner of a controlled landfill shall submit a closure report to the board within 30 days of waste acceptance cessation. The board may request additional information as may be necessary to verify that permanent closure has taken place in accordance with the requirements of 9 VAC 20-80-250 E. If a closure report has been submitted to the board, no additional wastes may be placed into the landfill without

obtaining a permit issued by the department under Part VII (9 VAC 20-80-480 et seq.) of 9 VAC 20 Chapter 80 (Solid Waste Management Regulations).

G. Each owner of a controlled landfill shall submit an equipment removal report to the board 30 days prior to removal or cessation of operation of the control equipment.

1. The equipment removal report shall contain all of the following items:

a. A copy of the closure report submitted in accordance with subsection F of this section;

b. A copy of the initial compliance test report demonstrating that the 15 year minimum control period has expired; and

c. Dated copies of three successive NMOC emission rate reports demonstrating that the landfill is no longer producing (i) 23 megagrams or greater of NMOC per year in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 50 megagrams or greater of NMOC per year in the remaining areas of the Commonwealth.

2. The board may request such additional information as may be necessary to verify that all of the conditions for removal in 9 VAC 5-40-5820 C 2 e have been met.

H. Each owner of a landfill seeking to comply with 9 VAC 5-40-5820 C 2 using an active collection system designed in accordance with 9 VAC 5-40-5820 C 2 b shall submit to the board annual reports of the recorded information in subdivisions H 1 through H 6 of this section. The initial annual report shall be submitted within 180 days of installation and startup of the collection and control system, and shall include the initial compliance test report. For enclosed combustion devices and flares, reportable exceedances are defined under 9 VAC 5-40-5890 E.

1. Value and length of time for exceedance of applicable parameters monitored under 9 VAC 5-40-5870 C, D, E, and F.

2. Description and duration of all periods when the gas stream is diverted from the control device through a bypass line or the indication of bypass flow as specified under 9 VAC 5-40-5870.

3. Description and duration of all periods when the control device was not operating for a period exceeding one hour and length of time the control device was not operating.

4. All periods when the collection system was not operating in excess of five days.

5. The location of each exceedance of the 500 parts per million methane concentration as provided in 9 VAC 5-40-5822 A 4 and the concentration recorded at

each location for which an exceedance was recorded in the previous month.

6. The date of installation and the location of each well or collection system expansion added pursuant to subdivisions C 3, D, and E 4 of 9 VAC 5-40-5850.

I. Each owner seeking to comply with 9 VAC 5-40-5820 C 2 a shall include the following information with the initial compliance test report:

1. A diagram of the collection system showing collection system positioning including all wells, horizontal collectors, surface collectors, or other gas extraction devices, including the locations of any areas excluded from collection and the proposed sites for the future collection system expansion;

2. The data upon which the sufficient density of wells, horizontal collectors, surface collectors, or other gas extraction devices and the gas mover equipment sizing are based;

3. The documentation of the presence of asbestos or nondegradable material for each area from which collection wells have been excluded based on the presence of asbestos or nondegradable material;

4. The sum of the gas generation flow rates for all areas from which collection wells have been excluded based on nonproductivity and the calculations of gas generation flow rate for each excluded area; and

5. The provisions for increasing gas mover equipment capacity with increased gas generation flow rate, if the present gas mover equipment is inadequate to move the maximum flow rate expected over the life of the landfill; and

6. The provisions for the control of off-site migration.

9 VAC 5-40-5890. Recordkeeping.

A. The provisions of 9 VAC 5-40-50 (Notification, records and reporting) apply.

B. Except as provided in 9 VAC 5-40-5820 C 2 a (2), the provisions of subsections C through G of this section apply.

C. Each owner of an MSW landfill subject to the provisions of 9 VAC 5-40-5820 C shall keep for at least five years up-to-date, readily accessible, on-site records of the design capacity report which triggered 9 VAC 5-40-5820 C, the current amount of solid waste in-place, and the year-by-year waste acceptance rate. Off-site records may be maintained if they are retrievable within four hours. Either paper copy or electronic formats are acceptable.

D. Each owner of a controlled landfill shall keep up-to-date, readily accessible records for the life of the control equipment of the data listed in subdivisions D 1 through D 4 of this section as measured during the initial compliance test or compliance

determination. Records of subsequent tests or monitoring shall be maintained for a minimum of five years. Records of the control device vendor specifications shall be maintained until removal.

1. Where an owner subject to the provisions of this article seeks to demonstrate compliance with 9 VAC 5-40-5820 C 2 b:

a. The maximum expected gas generation flow rate as calculated in 9 VAC 5-40-5850 C 1. The owner may use an alternative method to determine the maximum gas generation flow rate, if the method has been approved by the board.

b. The density of wells, horizontal collectors, surface collectors, or other gas extraction devices determined using the procedures specified in 9 VAC 5-40-5824 A 1.

2. Where an owner subject to the provisions of this article seeks to demonstrate compliance with 9 VAC 5-40-5820 C 2 c through use of an enclosed combustion device other than a boiler or process heater with a design heat input capacity equal to or greater than 44 megawatts:

a. The average combustion temperature measured at least every 15 minutes and averaged over the same time period of the compliance test.

b. The percent reduction of NMOC determined as specified in 9 VAC 5-40-5820 C 2 c (2) achieved by the control device.

3. Where an owner subject to the provisions of this article seeks to demonstrate compliance with 9 VAC 5-40-5820 C 2 c (2) (a) through use of a boiler or process heater of any size: a description of the location at which the collected gas vent stream is introduced into the boiler or process heater over the same time period of the compliance testing.

4. Where an owner subject to the provisions of this article seeks to demonstrate compliance with 9 VAC 5-40-5820 C 2 c (1) through use of an open flare, the flare type (i.e., steam-assisted, air-assisted, or nonassisted), all visible emission readings, heat content determination, flow rate or bypass flow rate measurements, and exit velocity determinations made during the compliance test as specified in 40 CFR 60.18; continuous records of the flare pilot flame or flare flame monitoring and records of all periods of operations during which the pilot flame of the flare flame is absent.

E. Each owner of a controlled landfill subject to the provisions of this article shall keep for five years up-to-date, readily accessible continuous records of the equipment operating parameters specified to be monitored in 9 VAC 5-40-5870 as well as up-to-date, readily accessible records for periods of operation during which the parameter boundaries established during the most recent compliance test are exceeded.

1. The following constitute exceedances that shall be recorded and reported under 9 VAC 5-40-5880 H:

a. For enclosed combustors except for boilers and process heaters with design heat input capacity of 44 megawatts (150 million British thermal units per hour) or greater, all 3-hour periods of operation during which the average combustion temperature was more than 28 degrees Celsius below the average combustion temperature during the most recent compliance test at which compliance with 9 VAC 5-40-5820 C 2 c was determined.

b. For boilers or process heaters, whenever there is a change in the location at which the vent stream is introduced into the flame zone as required under subdivision D 3 of this section.

2. Each owner subject to the provisions of this article shall keep up-to-date, readily accessible continuous records of the indication of flow to the control device or the indication of bypass flow or records of monthly inspections of car-seals or lock-and-key configurations used to seal bypass lines, specified under 9 VAC 5-40-5870.

3. Each owner subject to the provisions of this article who uses a boiler or process heater with a design heat input capacity of 44 megawatts or greater to comply with 9 VAC 5-40-5820 C 2 c shall keep an up-to-date, readily accessible record of all periods of operation of the boiler or process heater. (Examples of such records could include records of steam use, fuel use, or monitoring data collected pursuant to other state or federal regulatory requirements.)

4. Each owner seeking to comply with the provisions of this article by use of an open flare shall keep up-to-date, readily accessible continuous records of the flame or flare pilot flame monitoring specified under 9 VAC 5-40-5870 E, and up-to-date, readily accessible records of all periods of operation in which the flame or flare pilot flame is absent.

F. Each owner subject to the provisions of this article shall keep for the life of the collection system an up-to-date, readily accessible plot map showing each existing and planned collector in the system and providing a unique identification location label for each collector.

1. Each owner subject to the provisions of this article shall keep up-to-date, readily accessible records of the installation date and location of all newly installed collectors as specified under 9 VAC 5-40-5850 D.

2. Each owner subject to the provisions of this article shall keep readily accessible documentation of the nature, date of deposition, amount, and location of asbestos-containing or nondegradable waste excluded from collection as provided in 9 VAC 5-40-5824 A 3 a as well as any nonproductive areas excluded from collection as provided in 9 VAC 5-40-5824 A 3 b.

G. Each owner subject to the provisions of this article shall keep for at least five years up-to-date, readily accessible records of all collection and control system exceedances of the operational standards in 9 VAC 5-40-5822, the reading in the

subsequent month whether or not the second reading is an exceedance, and the location of each exceedance.

H. Landfill owners who convert design capacity from volume to mass or from mass to volume to demonstrate that the landfill design capacity is less than (i) 1.0 million megagrams or 1.0 million cubic meters in the Northern Virginia Volatile Organic Compound Emissions Control Area, or (ii) 2.5 million megagrams or 2.5 million cubic meters in the remaining areas of the Commonwealth, as provided in the definition of "design capacity," shall keep readily accessible, on-site records of the annual recalculation of site-specific density, design capacity, and the supporting documentation. Off-site records may be maintained if they are retrievable within four hours. Either paper copy or electronic formats are acceptable.

9 VAC 5-40-5900. Registration.

The provisions of 9 VAC 5-20-160 (Registration) apply.

9 VAC 5-40-5910. Facility and control equipment maintenance or malfunction.

The provisions of 9 VAC 5-20-180 (Facility and control equipment maintenance or malfunction) apply except that the provisions of 9 VAC 5-20-180 E, F, and G shall apply only to the emission standards set forth in 9 VAC 5-40-5830 and 9 VAC 5-40-5840.

9 VAC 5-40-5920. Permits.

A. A permit may be required prior to beginning any of the activities specified below if the provisions of 9 VAC 5 Chapter 50 (9 VAC 5-50) and 9 VAC 5 Chapter 60 (9 VAC 5-60) apply. Owners contemplating such action should review those provisions and contact the appropriate regional office for guidance on whether those provisions apply.

1. Construction of a facility.

2. Reconstruction (replacement of more than half) of a facility.

3. Modification (any physical change to equipment) of a facility.

4. Relocation of a facility.

5. Reactivation (restart-up) of a facility.

6. Operation of a facility.

B. MSW landfills required to install a collection and control system according to the provisions of 9 VAC 5-40-5820 shall apply for a permit amendment in accordance with Part VII (9 VAC 20-80-480 et seq.) of 9 VAC 20 Chapter 80 (Solid Waste Management Regulations).

C. Physical or operational changes made to an MSW landfill solely to comply

with this article are not considered construction, reconstruction, or modification for the purposes of 40 CFR 60 subpart WWW.

D. The owner of an MSW landfill subject to this article with a design capacity greater than or equal to 2.5 million megagrams and 2.5 million cubic meters is subject to Article 1 (9 VAC 5-80-50 et seq.) of 9 VAC 5 Chapter 80. When a landfill is closed, and either never needed control or meets the conditions for control system removal specified in 9 VAC 5-40-5820 C 2 e, an operating permit under Article 1 (9 VAC 5-80-50 et seq.) of 9 VAC 5 Chapter 80 is no longer required.

E. A landfill with a design capacity less than 2.5 million megagrams or 2.5 million cubic meters does not require an operating permit under Article 1 (9 VAC 5-80-50 et seq.) of 9 VAC 5 Chapter 80.

HISTORICAL NOTES:

Derived from: Rule 4-43 of Part IV of VR 120-01 (§ 120-04-4301 through § 120-04-4313)

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